CSE 191 Recitation

4/10/23 - 4/14/23 - Summations, Recurrence, and Induction

Summations

Compute the following summations

$$\sum_{k=0}^{5} 3k$$

$$\sum_{n=1}^{5} 6$$

Let $a_n = 3n + 4$

$$\sum_{n=1}^{5} a_n$$

$$\sum_{i=4}^{9} (i - 3)$$

$$\sum_{i=1}^{3} \sum_{j=2}^{4} ij$$

Recurrence Relations

Let $\{a_n\}$ be the sequence defined by the recurrence relation: $a_0 = 0$, $a_1 = 2$, $a_n = 2a_{n-2} - 2$

List out the first 10 terms of the sequence that satisfies this recurrence relation

Find an explicit formula for the nth term of this recurrence relation

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$$a_n = \begin{cases} -2(2^{n/2} - 1) & \text{if } n \text{ is even} \\ 2 & \text{if } n \text{ is odd} \end{cases}$$

Induction

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1. Express the statement being proved in the form " $\forall n \geq b$, $P(n)$ for a fixed integer b
2. Prove the **Base Case**: show that $P(b)$ is true.
3. Prove the **Inductive Case**
   a. State the inductive hypothesis in the form "assume that $P(k)$ is true for an arbitrary $k \geq b$
   b. State what must be proved under this assumption; write out $P(k + 1)$
   c. Prove the statement $P(k + 1)$ is true by using the assumption $P(k)$ is true. Be sure this proof is valid for all integers $k \geq b$
   d. Clearly identify the conclusion
4. Now that you have proven the Base Case and Inductive Case, conclude that $P(n)$ is true for all $n \geq b$